Ability to Count to Two. Opening Talk at the Third International Sakharov Conference on Physics [1]

Boris L. Altshuler [2]
Theoretical Physics Department, P.N. Lebedev Physical Institute, 53 Leninski Prospect, Moscow, 117991, Russia

Abstract

Third International Sakharov Conference on Physics organized by the Theoretical Physics Department of the Lebedev Institute, Russian Academy of Sciences, covered wide scope of topics: astrophysics, fusion, high field, high pressure and high density research, superstrings and dualities, brane world and quantum gravity, quantum field theory and high energy physics. This short Opening Word however exceeds the bounds of physics - it is about three "dynamical characteristics" of Sakharov's methodology and way of thinking: "Artseulov method", "a permanent feeling of possible personal error", and ability "to count to two", which in present days is not less demanded than before.

[1] Moscow, Lebedev Institute, June 24-29, 2002; www.sakharov.lpi.ru
[2] E-mail: altshuler@mtu-net.ru & altshul@lpi.ru

It is a pleasure and an honor to welcome participants and guests of the Third International Sakharov Conference on Physics here in the Lebedev Physical Institute. There is a number of intimate connections. Dmitry Sakharov, father of Andrei Sakharov, was a student of Petr Lebedev in the Physical Department of Moscow University. Pressure of light first observed by Lebedev was 40 years later used by Sakharov to trigger the H-bomb. There are also moral parallels: Petr Lebedev, who was more than far from politics, being a personality of high ethic principles could not help resigning from the University in a protest against Tsar Government repressions towards his colleagues. His Lab was destroyed, and although private sponsors began to build for him "Lebedev institute" his heart did not stand the disaster, he died in March 1912 in the age 46, and supposedly because of it did not receive Nobel Prize on Physics he was nominated to for his discovery.

Actually this Conference should have taken place a year ago, being dedicated to 80 years of Sakharov who was born in 1921. The reason for this delay was serious: in May 1999 Professor Efim Fradkin died, and in June 2000 Theoretical Physics Department organized in his memory the big international conference "Quantization, gauge fields and strings". To organize within a year one more huge conference was impossible. There is no doubt that Andrei Dmitrievich would approve of our actions in the memory of Efim S. Fradkin, whom he highly respected as personality and as scientist. He also very much respected Professor David Kirzhnits who died recently. It was David Kirzhnits who in his memoirs about Sakharov (see in [1]) most transparently compared Sakharov's methodology with the feat of Russian pilot Konstantin Artseulov during the First World War, who the first time in history of aviation deliberately dropped down his airplane into the mortal spin (thus committing a suicide in public, according to the hundreds of observers' opinion) and safely went out of it, creating the method which saved lives of hundreds of pilots. You see: it is always quite interesting to speak about Sakharov whose ideas and actions were really very often considered as "mortal", but they proved to be salutary for all of us after all.

In this short Opening Word I'll concentrate upon three "dynamical characteristics" of Sakharov's "method" and his way of thinking. **The first one**, which may be called, **"Artseulov method"** I already described above with the help of David Kirzhnits's metaphor: after Sakharov came to certain conclusion he preferred to act most resolutely and also as a good teacher. But to come to the conclusion was not a simple dynamical process. **Second feature**

of Sakharov's mentality may be called **"a permanent feeling of possible personal error"**. He writes in "Memoirs":

"My statements on general issues are often tentative, meant to provoke discussion, and subject to revision. I agree with Leszek Kolakowski when he writes: *"Inconsistency is simply a secret awareness of the contradictions of this world... a permanent feeling of possible personal error, or if not that, then of the possibility that one's antagonist is right"*. My only quarrel, - comments Sakharov after this quotation of Kulakowski, - is with the word "inconsistency", which I would replace with one that conveys my belief that intellectual growth and social awareness should combine dynamic self-criticism and a set of stable values... I am not a professional politician. Perhaps that is why I am always burdened by doubt about the usefulness and consequences of my actions. I inclined to the belief that a combination of moral criteria and unrestricted inquiry provides the only possible compass" ([2], pp. 579-580).

It is difficult to count how many times these Sakharov's sincere words "I am not a professional politician..." were used against him by Soviet propaganda. But we are talking now about something much more serious.

Sakharov really was a "thinking matter", everybody who personally knew him, I also was happy to contact him during 20 years, will confirm that his brain worked permanently and any moment he was ready to contemplate the problems of interest "as if he had a blank sheet of paper in front of him", - as Igor Evgenievich Tamm, his teacher and many years Chief of the Theoretical Physics Department, put it. The same was true with regards to Sakharov's own opinions and views: that is why it was so interesting to speak to him. But then the important question arises: If there were permanent doubts and "unrestricted inquiry" (in Sakharov's words cited above) how he managed to come to definite conclusions, why he was not a sort of "Chekhov's hero" incapable of any decision-making? Sakharov definitely was not a "Chekhov's hero", but his decision-makings were often rather difficult. It is not by chance that in quotations above he speaks about "stable values" and "moral criteria", i.e. about invariants which may serve a certain guideline. Idea of absolute priority of individual human rights - above any social, national, religious and other so called "great ideas" - was a product of permanent internal search of such an invariants.

But to explain why he reached so much it is also necessary to point out **one more feature of his mentality** - his special talent which is very

much advisable although not easy to learn from him: he was good at high mathematics, he was able, so to say, **"to count to two"**. The holism (in the Oriental language) of his thinking is well known. He could consider the problem at hand all at once, in all its complexity, with all its particulars, and, this being most important, in its dynamics. A space-time picture was obtained right away, with expected answer in the end. And all this, including actions already fulfilled or planned ones, was contemplated over again and again. Why I call this ability "to count to two"? During half of XX-th century half of Mankind admired Soviet socialism with its ideas of social justice (ONE) being incapable of noticing terror, GULAG etc. (TWO). Sakharov's idea of convergence, although being questionable by itself, was a sigh of relief for many and many.

One more example: "peacemaking" by western intellectual elite (there is no sense to argue against the good goal - peace is better than war, it is highest humane priority - ONE) in practice unfortunately was helping to push the Mankind closer to the thermonuclear abyss because "elite" did not manage to notice another side of the medal - aggressiveness of militarized Soviet closed society and hence necessity for the West (just for the sake of keeping and strengthening Peace) to be sufficiently strong (TWO). It was Sakharov who had a courage to reveal the truth speaking from inside the USSR, who supported "double solution" of NATO, which included additional deployment of rockets with nuclear warheads targeted at the Soviet cities (isn't it the Artseulov method?). Of course because of it he himself became a target of severe revenge of Soviet authorities; then "elite", colleagues supported Sakharov. As a result of this dialectic "Perestroika" began miraculously, Ronald Reagan came to the Red Square and rockets with nuclear charges began to be destroyed after all. (This time Mankind avoided the fall into the abyss, although it was real narrow escape; Sakharov was quite aware of the unacceptably high probability of the "fall").

Ability to see simultaneously both sides of a medal, to possess this "mental mirrors" is really a rear talent. This Sakharov's talent "to count to two" now is not less demanded than before. But some of you in this Hall may ask why I cover this moral and political issues at the physical conference? The answer is two-fold:

(1) Because this is "Sakharov" conference. Harry Lipkin from the Weizmann Institute of Science writes in [3]: "Andrei Dmitrievich had the remarkable ability to understand how systems function - all systems, social,

political, scientific, technological, as well as interfaces between them. In a sense he was a kind of an interdisciplinary systems super-engineer". That is why it seems reasonable even at this conference to exceed limits of physics, at least in short.

(2) Because we all know the value of speed of light, but what is the value of "speed of darkness"? Will the Mankind manage to win the race with mortal dangers capable of "putting off the Sun" for our civilization?

Sakharov died almost 13 years ago. Time moves on and now there are new hopes and new serious threats. World terror with its new weapon - suicide bombers, who potentially may be carriers of biological or nuclear tools of mass destruction. In this connection I draw attention to the most important and well balanced Statement by Elena Bonner (April 2002) where she outlined the global danger of this new weapon. Again plenty of people prove to be incapable "to count to two", got lost in two simple notions: "struggle with terror" and "human rights". Those who advocate active struggle with world terror sometimes have evident difficulties with embracing demands of human rights and humanity toward peaceful population - in this way deliberately or undeliberately supporting terrorists (unceasing drama in Chechnya is a dreadful example). Others - like now in Europe - seem to advocate human rights but ignore the vital necessity of taking active measures against terrorists - in this way also actively supporting terrorists and hence most terrible violations of human rights. I feel obliged to tell that members of the Theoretical Physics Department joined the collective protest of scientists against Israel-baiting campaign in Europe. This campaign visually shows that we are still too close to the precipice, and that Sakharov's talent to comprehend two sides of a medal simultaneously is strongly demanded, as well as his understanding that individual human rights must be considered above any national, religious and other corporate goals.

There are another dangers. General admiration of achievements in biophysics and gene engineering is accompanied by concerns about possibility of creating artificial virus capable to kill the civilization on the planet of Earth (is not our life "a permanent narrow escape"?). Steven Hawking recently said in an interview that he considers the death of Mankind because of such viruses inevitable and the only way out is our settling in cosmos. In this connection I would like to suggest perhaps even more secure option of settling the Mankind in the extra dimensions; this may be discussed at the Conference. In physics, like in the life of human society, modern days seem

to be also boiling and interesting. Of course Sakharov would be happy to participate in this Conference. And I wish it success in its work.

References

[1] "Sakharov Remembered. A tribute by friends and colleagues", American Institute of Physics & Physical Society of the USSR & Priroda magazine (Moscow), New-York, 1991.

[2] Andrei Sakharov, "Memoirs", Alfred A. Knopf, New-York, 1990.

[3] "Andrei Sakharov, Facets of a Life", Editions Frontieres & P.N. Lebedev Physics Institute. Cedex, 1991.